configuration closer to the implementation of FIG. 6A and 6B.

In FIG. 3B, a telescope consisting of lenses 55, 57 create a plane 26 conjugate to the input plane 24 of the focusing lens 12. The center of the conjugate plane 26, labeled point A, is conjugate to the center of the back aperture 28, labeled point B. Any beam passing through or emanating from point A passes through point B and forms an optical trap 10 in the subject cell. The beam-altering optical element 22 is centered on point A and diffracts input laser beam 100 into a fan-out of beamlets 101, 102, etc., each of which emanates from point A, and thus, each of which forms an optical trap 10.

This configuration separates the trap forming part of the optical train from the imaging part so that trapping and imaging can proceed simultaneously. In this case, the beam splitter 30 must be chosen to selectively reflect the trap forming laser light and to transmit the image-carrying light 32.

IN THE CLAIMS:

Please cancel Claims 20, 22, 55, 56, and 82, without prejudice or disclaimer.

Please enter the following amended claims:

1. (Amended) A method of forming a configurable array of probes comprising:

generating movable optical traps within a vessel;

providing at least two probes, each with one of a known binding and reactivity characteristic, within the vessel;

selecting at least said two probes for inclusion in a three dimensional array;

containing each of the selected probes with an optical trap to form the array; and

tracking at least one of the two probes using the optical trap which contains it.

2. (Amended) The method of claim 21, further comprising:

altering a position of at least one probe in the array by moving the optical trap containing the probe.

3. (Amended) The method of claim 21, wherein the optical traps are formed of two or more of optical tweezers, optical vortices, optical bottles, optical rotators, and light cages.

5. (Amended) The method of claim 2, wherein a movement of each optical trap is controlled by a computer.

6. (Amended) The method of claim 4, wherein a movement of each optical trap is controlled by a computer.

7. (Amended) The method of claim 4, wherein at least one of the two probes is selected by measuring a spectrum of the at least one probe and using a spectrum measurement to select the at least one probe.

8. (Amended) The method of claim 4, wherein at least one of the probes is selected by segregating the at least two probes, by known characteristics, at pre-determined locations within the vessel and using a location of each segregated probe to select the probe.

9. (Amended) The method of claim 8, further comprising:

placing the selected probes into at least one physical sub-cell disposed within the vessel.

11. (Amended) The method of claim 21, wherein the probe is a biological material.

12. (Amended) The method of claim 21, wherein the probe is a chemical material.

17. (Amended) The method of claim 11, wherein the probe is one of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, and RNA, or combinations thereof.

18. (Amended) The method of claim 13, wherein the biological material is one of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, and RNA, or a combination thereof.

19. (Amended) The method of claim 15, wherein the target is selected from one or more of the group consisting of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, and RNA, or a combination thereof.

21. (Amended) The method of claim 1, wherein at least some of the probes are [all] either one of bound to a substrate and unbound to a substrate.

23. (Amended) A method of forming a dynamic, configurable array of probes, comprising:

generating movable optical traps within a vessel;

monitoring the optical traps;

providing at least two probes, each with one of a known binding and reactivity characteristic, within the vessel;

selecting at least two probes for inclusion in a three dimensional array;

containing each of the selected probes with an optical trap to configure the array; and,

tracking at least one of the selected probes using the optical trap which contains it.

24. (Amended) The method of claim 20, further comprising:

altering a position of at least one probe in the array by moving the optical trap containing the probe.

25. (Amended) The method of claim 54, the method further comprising:

producing an optical data stream.

27. (Amended) The method of claim 24, wherein a movement of each optical trap is controlled by a computer.

28. (Amended) The method of claim 25, further comprising:

receiving the optical data-stream with a computer.

29. (Amended) The method of claim 28, the method further comprising:

analyzing the optical data stream with the computer.

30. (Amended) The method of claim 29, wherein the computer directs the movement of at least one optical trap based on an analysis of the optical data stream.

31. (Amended) The method of claim 25, further comprising:

converting the optical data-stream to a video signal.

32. (Amended) The method of claim 31, further comprising:

receiving the video signal with a computer.

33. (Amended) The method of claim 32, further comprising:

analyzing the video signal with the computer.

34. (Amended) The method of claim 33, further comprising:

using the computer to direct a movement of one or more optical traps based on the analysis of the video signal.

36. (Amended) The method of claim 35, further comprising:

viewing the image and directing a movement of one or more optical traps based on the viewing of that image.

37. (Amended) The method of claim 25, further comprising:

analyzing a spectrum of the optical data-stream.

38. (Amended) The method of claim 37, further comprising:

using a computer to direct a movement of one or more optical traps based on the analysis of spectrum of the optical data stream.

39. (Amended) The method of claim 54, further comprising:

forming two or more of one of optical tweezers, optical vortices, optical bottles, optical rotators, and light cages.

40. (Amended) The method of claim 26, wherein a movement of each optical trap is controlled by a computer.

41. (Amended) The method of claim 54, wherein at least one of the selected probes is selected by measuring a spectrum of at least one probe and using the spectral measurement to select the probe.

42. (Amended) The method of claim 24, wherein at least one of the selected probes is selected by segregating the probes, by known characteristics, at pre-determined locations within the vessel and using a location of each probe as a criteria to select the probe.

43. (Amended) The method of claim 42, further comprising:

placing the selected probes into at least one physical sub-cell disposed within the vessel.

45. (Amended) The method of claim 54, wherein the probe is a biological material.

46. (Amended) The method of claim 54, wherein the probe is a chemical material.

51. (Amended) The method of claim 45, wherein the probe is one of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, and RNA, or combination thereof.

52. (Amended) The method of claim 47, wherein the target is one of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, and RNA, or a combination thereof.

53. (Amended) The method of claim 49, wherein the target is selected from one or more of the group consisting of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, and RNA, or a combination thereof.

54. (Amended) The method of claim 23, wherein at least some of the probes are either one of bound and unbound to a substrate.

57. (Amended) A method of assaying biological material comprising:

generating movable optical traps within a vessel;

providing a fluid media in the vessel;

providing at least two probes, each with a known characteristic for one of binding and reacting with a biological target, within the vessel;

selecting at least two probes for inclusion in a three dimensional array;

containing each of the selected probes with the optical trap;

introducing into the vessel biological targets; and,

determining whether a reaction takes place, between each of the selected probes with each of the targets.

58. (Amended) The method of claim 57, further comprising:

tracking each probe of the selected probes throughout the assay using the optical trap which contains it.

61. (Amended) The method of claim 59, wherein the probe is one of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregation of cells, a microorganism, a peptide, cDNA, and RNA, or combination thereof.

62. (Amended) The method of claim 57, wherein the target is one of an oligonucleotide, a polynucleotide, a chemical compound, a protein, a saccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregation of cells, a microorganism, a peptide, cDNA, and RNA, or combination thereof.

63. (Amended) A method of assaying biological material comprising:

generating movable optical traps within a vessel;

providing a fluid media in the vessel;

monitoring the optical traps;

providing at least two probes, each with a known characteristic for one of binding and reacting with a biological target, within the vessel;

selecting at least two probes for inclusion in a three dimensional array;

containing each of the selected probes with the optical trap;

introducing into the vessel biological targets; and

determining whether a reaction takes place, between each of the probes with each of the targets.

64. (Amended) The method of claim 63, further comprising:

tracking each probe throughout the assay using the optical trap which contains it.

65. (Amended) The method of claim 63, further comprising:

altering a position of at least one probe in the array by moving the optical trap containing the probe.

66. (Amended) The method of claim 63, further comprising:

producing an optical data stream.

67. (Amended) The method of claim 65, wherein each optical trap is movable independently of other probes.

68. (Amended) The method of claim 65, wherein a movement of each optical trap is controlled by a computer.

69. (Amended) The method of claim 66, further comprising:

receiving the optical data-stream with a computer.

70. (Amended) The method of claim 69, further comprising:

analyzing the optical data stream with the computer.

71. (Amended) The method of claim 70, further comprising:

using the computer to direct a movement of one or more optical traps based on the analysis of the optical data stream.

72. (Amended) The method of claim 66, further comprising:

converting the optical data-stream to a video signal.

73. (Amended) The method of claim 72, further comprising:

receiving the video signal with a computer

74. (Amended) The method of claim 73: further comprising:

analyzing the video signal with the computer.

75. (Amended) The method of claim 74, further comprising:

using the computer to direct movement of one or more optical traps based on the analysis s of the video signal .

77. (Amended) The method of claim 76, further comprising:

viewing the image and directing the movement of one or more optical traps based on the viewing of that image.

78. (Amended) The method of claim 66, further comprising:

analyzing a spectrum of the optical data-stream.

79. (Amended) The method of claim 78, further comprising:

using a computer to direct movement of one or more optical traps based on the analysis of spectrum of the optical data stream.

80. (Amended) The method of claim 63, further comprising:

forming two or more different classes of optical traps selected from the group consisting of optical tweezers, optical vortices, optical bottles, optical rotators, and light cages.

81. (Amended) The method of claim 63, wherein at least one of the probes is either one of bound and unbound to a substrate.

83. (Amended) The method of claim 81, wherein each of the substrates which bind the probes

having the same known characteristic contain the same label.

85. (Amended) The method of claim 84, wherein at least one of the probes is selected by measuring a spectral response of at least one probe and using the spectral measurement to determine whether to contain the probe.

86. (Amended) The method of claim 63, wherein at least one selected probe is accomplished by segregating the probes, by each known characteristic, at pre-determined locations within the vessel and using a location of each probe to select the probe.

87. (Amended) The method of claim 63, further comprising:

placing the selected probes into at least one physical sub-cell disposed within the vessel.

88. (Amended) The method of claim 86, wherein the sub-cell is an optical sub-cell.

89. (Amended) A method of forming a configurable array of probes comprising:

generating movable optical traps within a vessel;

providing at least two probes, each with one of a known binding and reactivity characteristic, within the vessel; and,

configuring a three dimensional array of at least two probes by selecting each probe with an optical trap.

90. (Amended) A method of forming a configurable array of probes comprising:

directing a focused beam of light at a beam altering optical element to form a plurality of beamlets;

overlapping the beamlets at a back aperture of a focusing lens;

passing the beamlets through the focusing lens and converging the beamlets to generate movable optical traps within the vessel;

providing a plurality of probes, each with one of a known binding and reactivity characteristic, within the vessel;

selecting at least two probes for inclusion in a three dimensional array;

containing each selected probe with the optical trap; and,

altering a position of at least one probe by moving the optical trap containing the probe.

91. (Amended) The method of claim 90, wherein the beam altering optical element has a static surface.

92. (Amended) The method of claim 91, wherein the static surface is comprised of two or more discreet non-homogeneous regions.

93. (Amended) The method of claim 92, wherein a position of at least one probe trap is altered by changing a discrete non-homogeneous region of the static surface receiving the beam of light.

94. (Amended) The method of claim 91, wherein the static surface is continuously varying.

95. (Amended) The method of claim 91, wherein a position of the at least one optical trap is

altered by changing a region of the static surface receiving the beam of light .

96. (Amended) The method of claim 91, wherein the beam altering optical element is one of a grating, a diffraction grating, a reflective grating, a transmissive grating, a hologram, a stencil, a light shaping holographic filter, a polychromatic hologram, a lens, a mirror, a prism, a waveplate and a hologram.

97. (Amended) The method of claim 92, wherein each discrete non-homogeneous region is one of a grating, a diffraction grating, a reflective grating, a transmissive grating, a hologram, a stencil, a light shaping holographic filter, a polychromatic hologram, a lens, a mirror, a prism, a waveplate and a hologram.

98. (Amended) The method of claim 90, wherein the beam altering optical element is dynamic.

99. (Amended) The method of claim 98, wherein a position of the at least one optical trap is altered by varying the dynamic beam altering optical element.

100. (Amended) The method of claim 99, wherein varying the dynamic beam altering optical element alters a phase profile of the at least one of the beamlets.

101. (Amended) The method of claim 100, wherein the optical trap generated by a change in phase profile is one of an optical tweezer, an optical vortex, an optical bottle, an optical rotator, and a light cage.

102. (Amended) The method of claim 93, wherein changing the discrete non-homogeneous region alters the phase profile of the at least one of the beamlets.

103. (Amended) The method of claim 102, wherein the optical trap generated by a change in phase profile is one of an optical tweezer, an optical vortice, an optical bottle, an optical rotator, and a light cage.

104. (Amended) A method of assaying a biological material comprising:

generating movable optical traps within a vessel;

providing a fluid media in the vessel;

monitoring the optical traps;

providing biological material within the vessel;

illuminating the biological material with a source suitable for spectral measurement;

measuring the spectrum of the biological material;

using the spectral measurement to select the biological material to use as probes in a three dimensional array;

containing the selected biological probes with an optical trap;

introducing into the vessel biological targets; and,

determining whether a reaction takes place, between each of the probes with each of the targets.

Please add the following new Claims 168-172:

168. (New) A method of forming a configurable array of probes comprising:

generating a plurality of movable optical traps simultaneously within a vessel;

providing at least two probes, each with one of a known binding and reactivity characteristic, within the vessel;

selecting at least said two probes for inclusion in an array;

containing each of the selected probes with an optical trap to form the array; and

tracking at least one of the two probes using the optical trap which contains it.

169. (New) A method of assaying biological material comprising:

generating a plurality of movable optical traps simultaneously within a vessel;

providing a fluid media in the vessel;

monitoring the optical traps;

providing at least two probes, each with a known characteristic for one of binding and reacting with a biological target, within the vessel;

selecting at least two probes for inclusion in an array;

containing each of the selected probes with the optical trap;

introducing into the vessel biological targets; and

determining whether a reaction takes place, between each of the probes with each of the targets.

170. (New) A method of forming a configurable array of probes comprising:

generating a plurality of movable optical traps simultaneously within a vessel;

providing at least two probes, each with one of a known binding and reactivity characteristic, within the vessel; and,

configuring an array of at least two probes by selecting each probe with an optical trap.

171. (New) A method of forming a configurable array of probes comprising:

directing a focused beam of light at a beam altering optical element to form a plurality of beamlets;

overlapping the beamlets at a back aperture of a focusing lens;

passing the beamlets through the focusing lens and converging the beamlets to generate a plurality of movable optical traps simultaneously within the vessel;

providing a plurality of probes, each with one of a known binding and reactivity characteristic, within the vessel;

selecting at least two probes for inclusion in an array;

containing each selected probe with the optical trap; and,

altering a position of at least one probe by moving the optical trap containing the probe.

172. (New) A method of assaying a biological material comprising:

generating a plurality of movable optical traps simultaneously within a vessel;

providing a fluid media in the vessel;

monitoring the optical traps;

providing biological material within the vessel;

illuminating the biological material with a source suitable for spectral measurement;

measuring the spectrum of the biological material;

using the spectral measurement to select the biological material to use as probes in an array;

containing the selected biological probes with an optical trap;

introducing into the vessel biological targets; and

determining whether a reaction takes place, between each of the probes with each of the targets.